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'Experimental Rage': The Development of Medical Ethics and the Genesis of Scientific Facts

Ludwik Fleck: An Answer to the Crisis of Modern Medicine in Interwar Germany?

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SUMMARY. In 1930, the large-scale introduction of the BCG vaccination in the city of Lübeck in northern Germany led to a major scandal that focused public attention on medical experimentation with human beings as well as reviving criticism of the medical profession that had been voiced before. The trial following the catastrophe raised the first clearly identifiable public discussions on medical ethics in Europe, and led to the establishment of the first regulations for medical research on human beings in the western hemisphere; the German '*Richtlinien*' of 1931. In 1935, Ludwik Fleck (1896–1961) published a now classic monograph entitled *Genesis and Development of a Scientific Fact*. The central hypothesis of this article is that, when Fleck published his book four years after the Lübeck trial, he was proposing answers to questions raised, at least partially, by the Lübeck case, although he never explicitly mentions it. Most interestingly, Fleck proposed a different approach to the fundamental dilemma of modern experimental medicine, the potential opposition between an individual's well-being, and the production and application of scientific knowledge in medicine. Where the standard answer to these questions has, since the 1930s, become moral reasoning and ethical regulation, known today as bioethics, Fleck portrays a different approach that could be characterized as the attempt to foster a deeper and more democratic understanding of science through an examination of its intimate functioning.

KEYWORDS: Ludwik Fleck, Lübeck, bacteriology, human experimentation, BCG vaccination, Julius Moses, medical ethics, scientific facts, 1930s, scientific knowledge.

Introduction

Twenty years ago, the rediscovery of an almost forgotten medical microbiologist and philosopher of science, Ludwik Fleck (1896–1961), turned the author of *Genesis and Development of a Scientific Fact* into a Gregor Mendel of the history and philosophy of science.[1] Ever since, Fleck has occupied a place among the 'classical'

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[1] L. Fleck, *Entstehung und Entwicklung einer Wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv* (Basel, 1935). For a detailed account of the reception of the writings by Ludwik Fleck, see R. S. Cohen and T. Schnelle (eds), *Cognition and Fact. Materials on Ludwik Fleck* (Dordrecht, 1986); L. Schäfer and T. Schnelle, 'Einleitung. Ludwik Flecks Begründung des Soziologischen Betrachtungsweise in der Wissenschaftstheorie', in L. Fleck, *Entstehung und Entwicklung einer Wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv* (Frankfurt, 1980), vii–xlix. For the history of the rediscovery of Gregor Mendel's work in plant genetics, see J. M. Drouin, 'Mendel, Côté Jardin', in M. Serres (ed.), *Elements d'Histoire des Sciences* (Paris, 1989), 407–21;

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figures of both epistemology and the social history of science comparable to Karl Popper or Robert Merton. After the English translation of Fleck's monograph in 1979[2] and the new German edition of 1980,[3] substantial interest has been aroused by materials and interpretations of the physician-philosopher who has become a pioneer of 'the constructivist-relativist trend in the philosophy of science and of the sociological approach to the study of the evolution of scientific and medical knowledge'.[4] In this reappraisal of Fleck's work, the interest of scholars has mainly concentrated on Fleck's earlier and subsequent writings, his personal, intellectual, and philosophical biography and the context of Lwow (his birth-place), Polish philosophy and medicine.[5]

In contrast, this article aims to situate Ludwik Fleck in his social context. Using his own terms, the context may be conceived as the thought-collective of German-speaking medicine in the 1930s. This contextualization of Fleck does not intend to add another explanation to an already long list of influences that shaped his thinking, but is directed towards achieving something else. Modern medicine in Germany was, to a certain extent, in a state of crisis in the interwar period. There are three major features that characterize what I refer to here as modern scientific medicine. First, it was based upon an essentially biological vision of man and of sickness. Secondly, modern scientific medicine was characterized by the invention of the 'social body' and, as a consequence, its medical administration and treatment; taking care of groups of people.[6] The third major feature was the extension of the medical market, especially through the introduction of social welfare systems and national health insurance in Europe.[7] This extension was clearly directed towards the poor and lower social classes.[8] At the same time, it was concomitant

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R. Olby, 'Mendel No Mendelian?', *History of Science*, 17 (1979), 53–72; A. Brannigan, *Le Fondement Social des Découvertes Scientifiques* (Paris, 1996).

[2] L. Fleck, *Genesis and Development of a Scientific Fact* (Chicago, 1979), ed. T. J. Trenn and R. K. Merton, trans. F. Bradeley and T. J. Trenn, Foreword by T. S. Kuhn.

[3] L. Fleck, *Entstehung und Entwicklung einer Wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv* (Frankfurt, 1980), ed. L. Schäfer and T. Schnelle.

[4] I. Löwy, *The Polish School of Philosophy of Medicine. From Tytus Chalubinski (1820–89) to Ludwik Fleck (1896–1961)* (Dordrecht, 1990), pp. 5–8.

[5] Cohen and Schnelle, *Cognition and Fact*; T. Schnelle, *Ludwik Fleck: Leben und Denken* (Freiburg, 1982); L. Fleck, *Erfahrung und Tatsache. Gesammelte Aufsätze. Mit einer Einleitung herausgegeben von L. Schäfer und T. Schnelle* (Frankfurt, 1983); J. Harwood, 'Ludwik Fleck and the Sociology of Knowledge', *Social Studies of Science*, 16 (1986), 173–87; I. Löwy, 'The Scientific Roots of Constructivist Epistemologies: Hélène Metzger and Ludwik Fleck', in G. Freudenthal (ed.), *Etudes sur Hélène Metzger* (Paris, 1988), 219–35; J. Golinski, 'The Theory of Practice and the Practice of Theory: Sociological Approaches in the History of Science', *Isis*, 81 (1990), 492–505.

[6] In an historical perspective, the notion of the social body is obviously linked to the idea of public health. See D. Porter, 'Public Health', in W. F. Bynum and R. Porter (eds), *Companion Encyclopedia of the History of Medicine* (London, 1993), 1231–61. For a study of the German situation, see P. Weindling, *Health, Race and German Politics between National Unification and Nazism, 1870–1947* (Oxford, 1989).

[7] N. Bosanquet, 'Health Economics: Finance, Budgeting, and Insurance', in Bynum and Porter (eds), *Companion Encyclopedia*, pp. 1373–90. For the German system of national health insurance, see U. Frevert, *Krankheit als Politisches Problem 1770–1880* (Göttingen, 1984).

[8] For a recent contribution to the social history of hospitals in this transformation in Germany, see A. Labisch and R. Spree, *'Einem jeden Kranken in einem Hospitale sein eigenes Bett'. Zur Sozialgeschichte des Allgemeinen Krankenhauses in Deutschland im 19. Jahrhundert* (Frankfurt, 1996).

with an increase in the social status of a rising medical profession.[9] This divergent development—increasing numbers of poor patients and growing medical authority—led to a profound transformation in the doctor–patient relationship and a growing tension between the general public and the medical profession.

The use of the term 'crisis' became ubiquitous in the late 1920s in medical circles in Germany and it contained manifold ethical, political, epistemological, and metaphysical implications.[10] Without giving a full social history of this term here, it seems useful to clarify to some extent its role and meaning for the key protagonists in this article and for the events in Lübeck. In 1929, Ludwig Fleck published a paper on the 'crisis of reality',[11] where he highlighted the social aspects of scientific practice and claimed that scientific reality was relative and historically variable. He further elaborated these ideas in his 1935 monograph, especially in respect to his own field of scientific research, medical bacteriology. The lasting uncertainty and the cultural co-determination of scientific facts defined what will be identified in the following as Fleck's crisis of scientific knowledge. In the same year, Julius Moses (1868–1942), a contemporary observer and commentator of the Lübeck events, published a book review entitled *The Crisis of Medicine*.[12] He portrayed the crisis of the medical profession as an '*Entfremdung*' (distancing) between patients and physicians, and their growing mutual distrust. Both of these papers were published before the Lübeck scandal, indicating that the initial motivation of both authors for criticism lay outside the events of 1930. I will argue, however, that the Lübeck vaccination scandal pushed forward their individual approaches and analysis. Furthermore, I will maintain that the Lübeck scandal illustrated and combined both 'crises' identified above despite their evident differences.

In 1930, the large-scale introduction of the BCG vaccination in the city of Lübeck in northern Germany[13] led to a major scandal that focused public attention on medical experimentation with human beings as well as reviving criticism of the medical profession that had been voiced previously.[14] The trial following the catastrophe raised the first clearly identifiable public discussions on medical ethics in Europe, and led to the establishment of the first regulations for medical research on human beings in the western hemisphere; the German '*Richtlinien*' of 1931.[15]

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[9] C. Huerkamp, *Der Aufstieg der Ärzte im 19. Jahrhundert Vom Gelehrten Stand zum Professionellen Experten: das Beispiel Preussens* (Göttingen, 1985).

[10] A. Harrington, *Reenchanted Science. Holism in German Culture from Wilhelm II to Hitler* (Princeton, NJ, 1996); E. M. Klasen, 'Die Diskussion über eine "Krise" der Medizin in Deutschland zwischen 1925 und 1935' (unpublished MD thesis, University of Mainz, 1984). For earlier criticism, see M. Dinges (ed.), *Medizinkritische Bewegungen im Deutschen Reich* (Stuttgart, 1997).

[11] L. Fleck, 'Zur Krise der "Wirklichkeit"', *Die Naturwissenschaften*, 17 (1929), 425–30.

[12] J. Moses, 'Die Krise der Medizin', *Biologische Heilkunst*, 10 (1929), 804–5, 832–3.

[13] For a general presentation, see S. Hahn, '"Der Lübecker Totentanz". Zur Rechtlichen und Ethischen Problematik der Katastrophe bei der Erprobung der Tuberkuloseimpfung 1930 in Deutschland', *Medizinhistorisches Journal*, 30 (1995), 61–79; P. Menut, 'The Lübeck Catastrophe and its Consequences for Anti-tuberculosis BCG Vaccination', in A. M. Moulin and A. Cambrosio (eds), *Singular Selves. Historical Issues and Contemporary Debates in Immunology* (Amsterdam, 2001), 202–10.

[14] For material on medical experimentation on human subjects between 1900 and 1930, see R. Steinmann, 'Die Debatte über Medizinische Versuche am Menschen in der Weimarer Zeit' (unpublished MD thesis, University of Tübingen, 1975); B. Elkeles, *Der Moralische Exkurs über das Medizinische Menschenexperiment im 19. Jahrhundert* (Stuttgart, 1996); E. Tashiro, *Die Waage der Venus. Venerologische Versuche am Menschen am Menschen in der Zeit von 1885 und 1914* (Husum, 1991). For a general perspective, see S. E. Lederer, *Subjected to Science: Human Experimentation in America Before the Second World War* (Baltimore, 1995).

The analysis established in this article is based on the archival material of the trial. The trial itself was the consequence of what Julius Moses,[16] a relentless critic of the events, has called the 'Lübeck Totentanz'.[17] 'Experimental rage' was the term coined by this German-Jewish physician in order to characterize and explain the failures and abuses that occurred. His answer to the general public's fading confidence in the medical profession and medical science was the initiative to establish guidelines for ethical conduct in research and practice. At the same time, he insisted on the accountability of medical research to both the public and the individual patient. At the core of the Lübeck medical trial was the question of how medical knowledge was produced and what degree of certainty could be established. In other words, the court inquired into the foundation and the functioning of medical practices based on scientific facts. The central hypothesis of this article is that, when Fleck published his *Genesis and Development* four years after the Lübeck trial, he was proposing answers to questions raised by the Lübeck case although he never explicitly mentions it. Most interestingly, and as I will argue here, Fleck proposed a different approach to the fundamental dilemma of modern experimental medicine; the potential opposition between an individual's well-being and the production and application of scientific knowledge in medicine. Following J. Moses' lead, the standard answer to these questions has, since the 1930s, become moral reasoning and ethical regulation, known today as bioethics.[18] In contrast, Fleck portrayed a different approach that could be characterized as the attempt to foster a deeper and more democratic understanding of science through an examination of its intimate functioning.

I retain for the title and the major part of this article the term of 'medical ethics', since it was the current designation for medical professional morality and deontological logic in the 1920s and 1930s.[19] Since the mid-1960s, a remarkable and often controversial transformation in awareness created new rules, designated ever since as bioethics. The key elements of this change reduced physicians' discretion, enhanced patients' autonomy and established external control of medical practices, innovations, and decisions. Even if these three aspects were clearly constitutive of the debates portrayed here for the 1930s, they were nevertheless generally established and recognized only forty years later.

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[15] H. M. Sass, 'Reichsrundschreiben 1931', *Journal of Medicine and Philosophy*, 8 (1983), 99–111 . For the historical genesis of the *Richtlinien*, see C. Bonah, 'Ethique et Recherche Biomédicale en Allemagne. Le Procès de Lübeck et les Richtlinien de 1931', *Journal International de Bioéthique*, 12 (2001), 23–39.

[16] D. S. Nadav, *Julius Moses (1868–1942) und die Politik der Sozialhygiene in Deutschland* (Gerlingen, 1985); D. S. Nadav, *Volksgesundheit als Aufgabe der Politik: der Gesundheitspolitiker Julius Moses und die Sozialhygieniker* (Bremen, 1983); K. Nemitz, 'Julius Moses—Nachlass und Bibliographie', *Internationale Wissenschaftliche Korrespondenz zur Geschichte der deutschen Arbeiterbewegung*, 10 (1974), 219–41.

[17] J. Moses, *Der Totentanz von Lübeck* (Radebeul/Dresden, 1930).

[18] For a historical presentation of bioethics, see B. Elkeles, 'Medizinische Menschenversuche gegen Ende des 19. Jahrhunderts und der Fall Neisser. Rechtfertigung und Kritik einer Wissenschaftlichen Methode', *Medizinhistorisches Journal*, 20 (1985), 135–48; H. T. Engelhardt and S. Spicker (eds), *The Use of Human Beings in Research* (Dordrecht, 1983); H. Helmchen and R. Winau (eds), *Versuche mit Menschen in Medizin, Humanwissenschaften und Politik* (New York, 1986); D. Rothman, *Strangers at the Bedside* (New York, 1992); W. T. Reich (ed.), *Encyclopedia of Bioethics*, 5 vols (New York, 1995); C. Wiesemann and A. Frewer (eds), *Medizin und Ethik im Zeichen von Auschwitz. 50 Jahre Nürnberger Ärzteprozeß* (Erlangen, 1996); U. Tröhler and S. Reiter-Theil (eds), *Ethics Codes in Medicine: Foundations and Achievements of Codification since 1947* (Aldershot, 1998).

[19] For a contemporary summary of the issues of medical ethics in Germany in the 1920s, see A. Moll, *Ärztliche Ethik. Die Pflichten des Arztes in allen Beziehungen seiner Thätigkeit* (Stuttgart, 1902). For a general presentation, see R. Baker, 'The History of Medical Ethics', in Bynum and Porter (eds), *Companion Encyclopedia*, pp. 852–87.

In what follows, I want to argue that the approaches adopted by Moses and Fleck did not merely happen to be developed at the same time, but that they expressed two ways of responding to the problems posed by modern scientific medicine that transcend the context of 1930s Germany and are still relevant today. In order to do so, I will first of all briefly present Ludwik Fleck and his theories, and then summarize the events and the trial in Lübeck. From 'experimental rage' to the 'genesis of a scientific fact' the article will propose a parallel reading of Moses' analysis of the Lübeck catastrophe and Fleck's historical and sociological reconstruction of the production of scientific knowledge. Questions raised by the catastrophe and their treatment in the courtroom are used to structure my analysis. The catastrophe in the city of Lübeck does not by itself account entirely for Fleck's crisis of scientific knowledge and Moses' crisis of the medical profession, but rather has to be seen as a representative example that closely combined these two approaches. Fleck only sporadically touches on the question of tuberculosis,[20] and does not mention Lübeck at all, but I believe that resonances can be established indicating that both authors were proposing similar yet divergent interpretations of the state of affairs in German-speaking medicine in the 1930s.

Fleck, Moses, and the Lübeck Vaccination Scandal of 1930

Ludwik Fleck was born in 1896 in Lwow, Poland.[21] His high school education was in Polish and also partially in German, as that language still remained present as a cultural heritage from the period when the city belonged, as Lemberg, to the Austrian Empire. From 1920 to 1923 Fleck was trained as assistant to Rudolf Weigl, a typhus specialist, at the Typhus Investigation Laboratory of Lwow University and at the State Hospital for Infectious Diseases. After receiving his medical degree from Lwow University in 1922, at the age of 26, Fleck directed the bacteriological and chemical laboratories of the General City Hospital. He spent the year of 1927 in Vienna specializing in bacteriological research under the direction of R. Kraus. From 1928, he directed the bacteriological laboratory of the Social Sick Fund in Lwow until his dismissal in 1935; probably an anti-Jewish measure. From 1935 to 1939 he worked exclusively in a private bacteriological laboratory that he had founded in 1923. Briefly made director of the City Microbiological Laboratory after the Russian takeover of Lwow, Fleck was removed from this position after the German occupation of Lwow in 1941. In 1942 he produced, with several colleagues, a vaccine for typhus based on human urine in the ghetto of Lwow. Finally, in 1943, he was arrested and deported to the Nazi concentration camp in Auschwitz where he was forced to work in the 'Hygiene Institute of the Waffen-SS and Police', opened in April 1943. Fleck was transferred in December 1943 to the concentration camp in Buchenwald.[22] After the liberation in April 1945, he returned to Poland where he became associate professor of microbiology.

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[20] Fleck, *Genesis and Development*, p. 77.

[21] The subsequent biographical information is based on Cohen and Schnelle, *Cognition and Fact*; T. Schnelle, *Ludwik Fleck: Leben und Denken*; L. Fleck, *Genesis and Development*; L. Fleck, *Erfahrung und Tatsache*.

In 1957, Fleck emigrated to Israel where he died in 1961. During the period from 1922 to 1935, corresponding to our main interest here, Fleck worked and published in microbiology on the etiology of lupus erythematosus,[23] the serology of typhus fever and the 'exanthin reaction',[24] syphilis,[25] and the variability of streptococci.[26] Fleck was probably attracted to the question of the variability of bacteria by the influence of the unorthodox ideas of his teacher, Rudolf Weigl.[27] Many of his publications appeared in leading German journals[28] and point clearly to Fleck's relationship with, and participation in, German-language medical science. In this respect he should be considered as a distinguished, yet somewhat marginal, microbiologist of the time; someone very familiar with the research of and discussions in the German community of microbiological scientists. This was precisely the group of scientific experts principally concerned with the spectacular events that took place in Lübeck between 1929 and 1931.

In his *Genesis and Development of a Scientific Fact*, Fleck argues that facts are not objectively given but collectively created. Furthermore, scientists' work is characterized by a tradition of shared assumptions, a thought-style. Members of research communities, or of thought-collectives, share common assumptions due to their education and collaboration. Roughly speaking, Fleck divides thought-collectives of the sciences into two concentric circles: an esoteric circle of experts, surrounded by the large exoteric circle of laymen. Any exchange of ideas and information between different thought-collectives, and with the wider audience, always requires translations and thus transformation of meanings. Furthermore, meanings are constantly subject to negotiation, even within a collective. Accordingly, the extent of meaning-stability and consensus in all phases of the sciences must be regarded as an empirical matter.[29] One of the central ideas Fleck proposes is that reality, as it is perceived, is the collective vision shaped and mediated by a social group, an active and selective Gestalt process. According to Fleck:

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[22] For a recent analysis of the confusing accounts of this period, see P. Weindling, *Epidemics and Genocide in Eastern Europe 1890–1945* (Oxford, 2000), pp. 333–52, 363–7.

[23] L. Fleck and L. Füllenbaum, 'Experimentelle Beiträge zur Ätiologie des Lupus Erythematodes', *Dermatologische Wochenschrift*, 84 (1927), 485–7; L. Fleck and L. Füllenbaum, 'Clinical and Experimental Contribution on Etiology of Lupus Erythematosus', *Urologic and Cutaneous Review*, 35 (1931), 358–61.

[24] L. Fleck, 'Über die Exanthin-Reaktion bei Meerschweinchen und Kaninchen', *Krankheitsforschung*, 8 (1930), 404–6; L. Fleck, 'Versuche über eine Lokale Hautreaktion mit Proteus X-19 Extrakten (Die Exanthinreaktion), *Zeitschrift für Immunitätsforschung und experimentelle Therapie*, 72 (1931), 282–300; L. Fleck and J. Hescheles, 'Über eine Fleckfieber-Hautreaktion (die Exanthinreaktion) und ihre Ähnlichkeit mit dem Dicktest', *Klinische Wochenschrift*, 10 (1931), 1075–6; L. Fleck and J. Hescheles, 'Über die Eigentümlichkeit der Exanthin- (Fleckfieberhaut-) Reaktion beim Menschen', *Zeitschrift für Immunitätsforschung und experimentelle Therapie*, 79 (1933), 514–20; L. Fleck, 'Über Hautreaktion mit Exanthin. Bemerkungen zu der Arbeit von Nemschilov', *Klinische Wochenschrift*, 13 (1934), 303–4.

[25] L. Fleck, 'Ein Fall von Pseudosyphiloma Anorectale Mykotischer Ätiologie (Kladiosis)', *Dermatologische Wochenschrift*, 90 (1930), 379–82.

[26] L. Fleck and E. O. Ludwik, 'Zur Variabilität der Streptokokken', *Zentralblatt für Bakteriologie*, 125 (1932), 180–200.

[27] Löwy, *The Polish School of Philosophy of Medicine*, p. 217.

[28] Most of Fleck's publications that were not in Polish were published in German language journals such as *Klinische Wochenschrift, Dermatologische Wochenschrift, Zentralblatt für Bakteriologie, Naturwissenschaften,* or the *Zeitschrift für Immunitätsforschung und experimentelle Therapie.*

> One individual belongs to several thought-collectives at once. As a research worker he is part of that community with which he works. . . . As a member of a political party, a social class, a nation, or even a race he belongs to other collectives.[30]

The general atmosphere prevailing in the professional thought-collective of German-speaking[31] medical microbiology in the 1930s can be characterized as a state of crisis of scientific knowledge. Events in Lübeck exemplify this perception.

At the dawn of the twentieth century, tuberculosis was a major public health concern in the western hemisphere. Between 1908 and 1921, L. C. A. Calmette (1863–1933) and C. Guérin (1872–1961) worked tirelessly to develop a long-awaited vaccine against the disease. The BCG ('Bacille de Calmette Guérin'), an attenuated strain of bovine Koch's bacillus, was initially introduced and tested in France in 1921.[32] Despite Calmette's seductive statistics, the results of the vaccination and its application were hotly debated and remained controversial in all European countries. In February 1930, two physicians in the city of Lübeck launched a public campaign for the vaccination of new-born babies against tuberculosis. The life-threatening disease was to be prevented by the administration of the French BCG-vaccine produced locally using a bacterial strain obtained from the Pasteur Institute in Paris. For over two months, 84 per cent of new-born babies in the city, more than 250 babies, were vaccinated. In late April the first complications appeared, and in May the vaccination campaign was stopped and a murder trial was instigated in the criminal courts. By February 1931, 77 of the new-born babies had died from complications due to the vaccination, and a further 131 were sick. A major trial, lasting for more than three months, aroused national and international public attention. In February 1931, the Lübeck court declared that the two physicians in charge of the vaccination programme were responsible. They were sentenced to prison and fined.[33] The extent of the catastrophe and its coverage by the general media, as well as the scientific press, turned the catastrophe into a scandal and the trial became a public battlefield over scientific medicine. Julius Moses, one of the central observers and critics of the Lübeck trial, declared publicly in 1930:

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[29] Harwood, *Ludwik Fleck and the Sociology of Knowledge*, pp. 177–8.

[30] Fleck, *Genesis and Development*, p. 45.

[31] The term 'German-speaking' refers in this context to the system of medical faculties and medical education that Joseph BenDavid has called a 'medical market place'. One of the key elements of that system was not the national boundary but rather the existence of a common language. The German-speaking system of medical education thus includes Germany, Austria, part of Switzerland, part of Poland, and by extension some of the Eastern countries whose educational systems were closely tied to this German language community. J. BenDavid and A. Zloczower, 'The Idea of the University and the Academic Market-Place', *Archives Européennes de Sociologie*, 2 (1961), 303–14; J. BenDavid and A. Zloczower, 'Universities and Academic Systems in Modern Society', *European Journal of Sociology*, 3 (1962), 45–84.

[32] A. Calmette, *Die Schutzimpfung gegen Tuberkulose mit BCG* (Leipzig, 1928), trans. Kalbfleisch; P. Menut, 'Ethique et Ethos de la Recherche Bio-médicale en France. Le Cas de l'Introduction de la Vaccination par le BCG: 1900–1930', in C. Bonah and E. Lepicard (eds), *Les Procès Médicaux: Lieux de Références, Révélateurs et Régulateurs d'Ethique comme d'Ethos* (Rapport Final au Ministère de l'Emploi et de la Solidarité et Ministère de la Justice, Strasbourg, 2000), 58–80.

> The Calmette catastrophe in Lübeck is like an earthquake: the confidence of the population in the medical profession has been destroyed at its very foundations.[34]

Through his training and his medical and scientific activity, and despite his personal, religious and national identity, Fleck participated in the thought-collective of German-speaking medicine. In return, as we will see, the same thought-collective had a profound influence on Fleck's ideas and visions. Indeed, it was only shortly after the storm of accusations, heated debates in the Reichstag, and polemic newspaper articles in relation to the Lübeck medical trial that Ludwik Fleck started to work on his *Genesis and Development*.

Before analysing the 'earthquake', let us turn briefly to the second significant character of our story, the German physician, Julius Moses.[35] A Jew, born in 1868 in Posnan, Julius Moses was one of the co-ordinating members of the German Social Democratic Party (SPD). In 1912, in a major controversy over declining birth rates and birth control, Moses, together with Alfred Bernstein, advocated a 'birth strike' and defended women's rights to self-determination.[36] After the First World War, Moses, together with Alfred Grotjahn (1869–1931) and Magnus Hirschfeld (1868–1935), unsuccessfully initiated a campaign for the creation of a Reich Ministry of Health directed by a physician. In contrast to most of his professional colleagues, Moses supported the activities of the sickness funds (Krankenkassen) and their journal 'Der Kassenarzt'. As a member of the German parliament from 1920 to 1932 and as the official SPD representative for public health and a member of the Reich Health Council (*Reichsgesundheitsrat*) he took an active part in discussions on the general state of affairs in medicine, public health, and the German medical corps. From 1928 onwards, he waged a relentless campaign against human experimentation[37] that found its ultimate validation in the Lübeck scandal. Despite some ambiguities, Moses did not reject research on human beings altogether, but insisted on accompanying mechanisms of public accountability.[38] This was precisely what he demanded in the case of the Lübeck catastrophe and the larger 'earthquake' surrounding it.

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[33] Landesarchiv Schleswig-Holstein (LASH), Abt. 352, Nr. 297, Urteil der II. Grossen Strafkammer des Landgerichts der freien Hansestadt Lübeck, 6 February 1931, pp. 156–216.

[34] Moses, *Der Totentanz von Lübeck*, p. 7.

[35] The subsequent biographical information is based on Nadav, *Julius Moses (1868–1942) und die Politik der Sozialhygiene,* pp. 120–36, 258–92; Nadav, *Volksgesundheit als Aufgabe der Politik*; K. Nemitz, 'Julius Moses—Nachlass und Bibliographie', pp. 219–41.

[36] K. Nemitz, 'Julius Moses und die Gebärstreik-Debatte 1913', *Jahrbuch des Instituts für Deutsche Geschichte*, 2 (1978), 321–35.

[37] J. Moses, '100 Ratten und 20 Kinder', *Der Kassenarzt*, 5 (10 March 1928), 1–2; J. Moses, 'Arzt und Experiment', *Der Kassenarzt*, 5 (21 April 1928), 1–2; J. Moses, 'Der Kampf gegen das Menschenexperiment', *Biologische Heilkunst*, 9 (1928), 687–9.

[38] Weindling, *Health, Race and German Politics*, pp. 485–6.

Crisis

Truth is not a convention, *but rather (1) in historical perspective, an event in the history of thought, (2) in its contemporary context, stylized thought constraint.*[39]

It is precisely the historical context of Fleck's writings that shall be stressed here as one key feature for the formation, and, consequently, a certain understanding of his theory. This is of particular interest since the historical context is not necessarily present in the mind of today's readers. Thus, several clear hints at contemporary debates made by Fleck can only be understood in the light of contemporary questions addressed to modern medicine, bacteriology, and science (*Naturwissenschaften*).

In the beginning was a crisis—a crisis within the medical profession triggered by the disappointments about therapeutic achievements of scientific medicine as it had been conceived since the mid-nineteenth century, and amplified by the general public's declining faith in modern medicine. Beate Waigand has recently shown, by analysing the official publication of the German Medical Corporation (*Deutscher Ärztevereinsbund*)[40] during the Weimar Republic, that the majority of German physicians were inclined to see themselves as victims of a crisis touching the medical corporation. After the rapid ascent of the medical profession during the Kaiserreich, the two decades after the First World War were a period of uncertainty and of a more sceptical relationship between physicians and patients. The key feature of this crisis was the claim that a growing number of patients were turning to alternative medical practices. According to the profession, five reasons explained this phenomenon. Most important was the conviction that these reasons were to be found outside the medical corporation itself. First, the sickness funds (*Krankenkassen*) were accused of engaging in political activity hostile to the medical profession; secondly, the growing number of physicians was linked to an impoverishment of the profession; thirdly, technical innovations were seen as leading to the mechanization of the healing art; fourthly, specialization was claimed to lead to the incapacity to take care of the patient as a whole person; and finally, growing competition amongst physicians enhanced the risk of commercial reasoning. The general impression was that the worrying decline in social and economic status could only be prevented by the creation of special regulation for the medical profession, the *Reichsärzteordnung*, which led to a specific and protected status for the medical corporation.[41]

In 1929, a year before the Lübeck catastrophe, Julius Moses published a book review entitled *The Crisis of Medicine*.[42] This was not his first critical paper on the stand taken by scientific academic medicine, but it was a visionary one. The crisis he portrays touches upon four slightly different, but related, elements. First, the majority of physicians opposed the system of social insurance, abortion, and the right of the patient to self-determination; secondly, physicians conducted medical experimentation upon patients without their consent; thirdly, physicians had lost the vision of the patient as a whole; finally, the lack of psychological comprehension of the patients by the physician made the patients turn away from official medical school medicine to parallel practices. This analysis from the social-democratic wing of the medical profession did not stress the external elements as reasons for the apparent loss of the patient's confidence, but rather the need for a critical self-examination of the profession's conduct and ideals. For Julius Moses, the central feature of the situation was that:

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[39] Fleck, *Genesis and Development*, p. 100, italics as in the original.

[40] The publication is the *Ärztliche Vereinsblatt*, which became in 1930 the *Deutsche Ärzteblatt*. According to Waigand, 90% of the German physicians were members of that corporative organization. B. Waigand, 'Antisemitismus auf Abruf. Die Geschichte des "Deutschen Aerzteblattes" und die Jüdischen Mediziner 1918–1933' (unpublished MD thesis, University of Freiburg, 2000).

[41] The Reichsärzteordnung was finally obtained on 13 December 1935. M. Rüther, 'Ärztliches Standeswesen im Nationalsozialismus 1933–1945', in R. Jütte (ed.), *Geschichte der Deutschen Ärzteschaft: Organisierte Berufs- und Gesundheitspolitik im 19. und 20. Jahrhundert* (Köln, 1997), 142–93, in particular pp. 173–5.

[42] Moses, 'Die Krise der Medizin', pp. 804–5, 832–3.

> Experimental rage has in large parts of the medical profession created an ethical and moral disaster. . . . Qualified and less qualified [physicians] transgress all barriers of morality, seeing themselves rather as researchers than as physicians. . . . The experimental craving (*Experimentiersucht*) is an illegal abuse of medical power.[43]

'Experimental rage' was the attitude Moses criticized most, as it transformed patients into 'human guinea pigs'.[44] The Lübeck medical catastrophe occurred in the midst of this general depression, and human experimentation was one of the accusations raised there. Hardly anybody in the field of medicine in Germany could have escaped the noisy affair in the early 1930s. A bacteriologist engaged in research on vaccines, and publishing papers on syphilis, tuberculosis, and the variability of bacteria[45] would most certainly have been deeply impressed by the catastrophe, the scientific questions it raised, and the judgement rendered by the courts. This was the precise background of the period when Fleck conceived and wrote his major monograph.

Ilana Löwy has argued that Fleck's interest in the philosophy of medical and scientific knowledge was at least partially triggered by his contact with the 'Polish School of Philosophy', and especially W. Bieganski and A. Wrzosek.[46] Furthermore, Löwy has demonstrated convincingly that the particular interest of Polish physicians in theoretical questions developed, at least in part, due to their relative marginality in international terms and their difficult professional situation.[47] Following this interpretation, one can argue that, in the 1930s, Ludwik Fleck found himself in the rather ambiguous situation of being very familiar with the central issues debated in Lübeck and at the same time maintaining a distance, observing events from his marginal point of view, which finally led to a different and more detached interpretation. This may explain to some extent the absence of any concrete reference to the Lübeck affair by Fleck.[48]

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[43] Moses, *Der Totentanz von Lübeck*, pp. 8–9.

[44] W. Kröner, *Unsere Kinder = Versuchskaninchen? Die Sachverständigenkomödie von Lübeck* (Berlin, 1930).

[45] Fleck, *Genesis and Development*, pp. 86–94.

[46] Löwy, *The Polish School of Philosophy*, pp. 69–120, 171–213.

[47] Ibid., pp. 4–5.

[48] Similarly, Fleck did not mention his ties with the Polish School of Philosophy of Medicine although they have been considered as essential to his thought and writings; ibid., pp. 5–6.

At this point we need to turn to Ludwik Fleck and his *Genesis and Development of a Scientific Fact*. Significantly, there is also a crisis on the very first page of Fleck's monograph; an economic crisis. Reflecting the historical events of October 1929, Ludwik Fleck chose precisely the theme of economic crisis in order to establish in the prologue of his monograph the first parallel between group determination in the elaboration of knowledge and the mass movement of panic selling at the stock exchange in a bear market. But Fleck did not only establish this analogy between the elaboration of scientific knowledge and the functioning of an economic crisis. Further on he acknowledged openly that at the present time, that is in 1935:

> The [scientific] elite panders, as it were, to public opinion and strives to preserve the confidence of the masses. This is the situation in which the thought-collective of science usually finds itself today.[49]

The apparent need for legitimization indicated that the medical sciences were under pressure from public opinion. In particular, uncertainty about former basic scientific knowledge in medical bacteriology appeared to Fleck, as to some of his contemporaries, to be a feature of the time.[50] The main difference between the analyses of L. Fleck and J. Moses is that Moses accused the system of scientific research, teaching, and medical practice of having lost its clear moral guidelines, whereas Fleck portrayed a deficiency in the (public) understanding of the system of science. Moses addressed the moral inadequacies of the education of individuals in the scientific system, whereas Fleck turned to the functioning of the scientific system itself. To the Lübeck court's initial question 'who was responsible?', Moses answered that it was the system of scientific research and education, whereas Fleck objected that we first have to ask 'how does science work?': 'What actually is a scientific fact?'.

In the description of the crisis of the economic system in Fleck's prologue, the individual was portrayed as a participator who lacked any awareness of his own participation. Accordingly, where Moses attacked the general attitude of the medical corporation as being irresponsible, Fleck portrayed it instead as being unaware. Individual physicians were members of a thought-collective ignoring constraints on thought that they were subject to. What changed from one perception to the other was essentially the question of responsibility and of how the general situation could be improved.

Scientific Knowledge as the Foundation for Medical Decision-making and Public Information

Let us return to the Lübeck catastrophe. In 1930, the city of Lübeck possessed a fairly advanced and well-organized system of public health. Prior to the introduction of a public vaccination campaign, the physicians in charge had to inform and convince the representatives of the local Council of Public Health of the effectiveness and safety of the project.[51] Only the conjuncture of a definite, permanent, and independent scientific fact—that the BCG vaccination was efficient and harmless—with the justification through an individual, social, and political argument—the positive evaluation of the procedure by the *Lübecker Ärzlicher Verein* and the city's *Gesundheitsamt* and *Gesundheitsrat*—could lead to the public health decision in favour of vaccination. This conjuncture was the basis of any medical decision and action. In case of failure, both initial parameters could be questioned; the justification for the scientific fact and the process of decision-making establishing that the benefits exceeded the risks. To my mind, this is precisely the central point where Fleck's crisis of scientific knowledge met with Moses' accusations of immoral conduct of the medical profession in the Lübeck case. Furthermore, it was the crucial issue for the Lübeck judges, as will be revealed in the next section.

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[49] Fleck, *Genesis and Development*, p. 105.

[50] For Fleck's feeling of a dawning revolution in bacteriology, see the paper by I. Löwy, 'The Epistemology of the Science of an Epistemologist of the Sciences: Ludwik Fleck's Professional Outlook and its Relationships to his Philosophical Works', in Cohen and Schnelle (eds), *Cognition and Fact*, 421–42.

What was the precise situation in Lübeck in 1929–30 and how was the vaccination decision made? In the initial phase of the vaccination campaign in the winter of 1929, the two physicians in charge, E. Altstaedt (1885–1953) and F. B. G. Deycke (1865–1937), organized meetings with the Council of Public Health of the city of Lübeck (*Gesundheitsrat*), composed of physicians and local political representatives, and the local Medical Association (*Lübecker Ärztlicher Verein*).[52] During these meetings, they presented information concerning effectiveness and safety based upon Calmette's French statistics and an official approval by the Society of Nation's hygiene commission in 1928. A prior disapproval of the vaccination published in 1927 by the Reich Health Office (*Reichsgesundheitsamt*) and still active in 1929 was completely omitted from this procedure. In January 1930, the two local authorities declared themselves in favour of public vaccination, and the campaign started on 24 February 1930. The official version of the trial and the verdict established that the two physicians knew of the controversy over the BCG vaccination and deliberately withheld information from the local Senate, the Council of Public Health and the general public. Another critic of the Lübeck events, the physician and advocate of 'natural medicine', Walter Kröner, declared in respect to the public information campaign:

> It meticulously withheld any information that could have really informed the subject. Not a word about the 'Calmette medium', although it consisted of living bacteria. Not a word about the method and the fact that it was controversial. Yet the city of Lübeck was preparing an experiment. All of this had to be hidden from the public, otherwise only very few people would have taken the risk of having the vaccination. But a large scale experiment was desired. The large scale of the experiment was necessary in order to pave the road for the general introduction of the vaccination in all of Germany.[53]

Moses shared this view but, rather than stigmatizing two individual physicians, he accused the whole system of scientific medicine in Germany in the 1930s of being immoral. He argued that the two physicians only did what physicians normally did at the time, no more and no less. Moral and legal judgements should be based on standards of routine practice of experimental medicine at the given time. Responsibility could only be taken for unusual actions transgressing regulations that had been clearly established beforehand. What should be judged and improved was not individual responsibility, but rather public accountability for the actions taken. Nevertheless, there was a scientific controversy about the BCG and the political, social, and individual justifications had been fundamentally biased towards hiding this controversy.

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[51] LASH, Abt. 352, Nr. 297, Urteil der II. Grossen Strafkammer, pp. 13–36.

[52] Ibid., pp. 23–38.

[53] W. Kröner and V. Noack, *Anti-Calmette* (Berlin, 1931), pp. 34–5.

What Moses did not question was the category of 'scientific fact' as such. He assumed, along with the court and the experts, that a fact was a fact, that cognition was a dual relationship between the knowing subject and the object to be known. It is here that Ludwik Fleck's approach becomes of importance. Nowhere in his monograph did he address the question of the moral values of individual scientists or general regulations governing research and practice. Rather, he directed his attention to the core of science and scientific practice. What is a fact? This was the initial question Fleck addressed to the reader in the prologue of his monograph. 'A fact is supposed to be distinguished from transient theories as something definite, permanent and independent of any subjective interpretation by the scientist.'[54] This was the standard answer that would be questioned in his work. Fleck retracted from this definition as soon as it had been pronounced and, subsequently, in a superb section on bacteriological examinations as diagnostic tools, he exposed the progressive transformation of a purely descriptive expert opinion into a 'simplification permeated with apodictic and graphic elements',[55] a scientific fact. But Fleck went even further. He showed how an expert's knowledge and the general public's faith mutually reinforced each other. In the end, he announced, what an individual sees and knows is not an individual process, but the result of a social activity. That someone acknowledges something to be a fact always demands a supplement:

> In a particular thought-style, in a particular thought-collective, . . . [that is] a community of persons mutually exchanging ideas or maintaining intellectual interaction.[56]

This means in the end that, although a thought-collective consists of individuals, it is more than the sum of its members. The individual in the collective is hardly ever conscious of the prevailing thought-style, which almost always exerts an absolutely compulsive force upon his thinking and with which it is not possible to be at variance.[57] The certainty of scientific knowledge, the very basis of scientific medicine and its decision-making, is only the outward sign of a process of construction in the esoteric circle determined collectively, socially, and historically. Scientific knowledge may serve decision-making in the medical field, but a fact should never be considered as definite, permanent, and independent of the observer's subjectivity. Where Moses asked physicians to account publicly for their activities, Fleck is looking instead for a better understanding of the scientific enterprise by scientists and lay-people. Fleck is breaking with the romantic and heroic vision of science; what he calls the 'I came, I saw, I conquered' epistemology.[58] The challenge is to the functioning of science in democracy and the democratic functioning of science.

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[54] Fleck, *Genesis and Development*, Prologue, p. xxvii.

[55] Ibid., p. 114.

[56] Ibid., pp. 38–9.

[57] Ibid., p. 41.

Scientific Facts, Legal Facts, and the Crisis of Bacteriology

Let us return once more to the Lübeck trial. The fundamental issue for the court was to establish how the deaths of 77 babies could be explained. What had happened? Only science, experts, and expert knowledge could possibly propose an interpretation of 'the weapons and the scene of the crime'. Indeed, the Lübeck trial was the medical experts' trial. For more than 23 days and over 30 per cent of the total time of the trial, 16 experts, the leading bacteriologists in the country, advanced their knowledge and opinions. Three possible scenarios were under consideration: immoral human experimentation, an accident with bad scientific practice, or bacterial variability indicating uncertainty of a fundamental scientific fact.[59] The first hypothesis, medical experimentation, supposed that the two physicians altered the production procedures of the vaccine and that they voluntarily introduced this altered vaccine in Lübeck in order to test it. This scenario assumed that the two physicians were engaged in the routine of a system of scientific medicine; obsessed by the research imperative and scientific publication, they totally neglected the welfare of the population. In his interpretations of the events Moses declared:

> I consider my duty to mobilize any person feeling responsible for the general public's health. These pernicious manifestations of medicine that are the cause of the Lübeck catastrophe need to be stopped. 75 (sic) children have been sacrificed to experimentation, this is an epidemic of experimentation (*Experimentierseuche*).[60]

The second hypothesis was that of an accident, with loose scientific practice responsible for an exchange or contamination of vaccination cultures in the Lübeck laboratory. This was the interpretation that was in the end retained by the court, establishing the individual responsibility of the two physicians that led to their condemnation.[61] Nevertheless, a close scrutiny of the judgement shows that this conviction was retained only as the most plausible hypothesis in the absence of totally compelling evidence, as major pieces of evidence had disappeared before the beginning of the instruction for the trial.[62] The third hypothesis was that of an accidental and unpredictable change occurring spontaneously in the bacteria itself: bacterial variability.[63] This assumption contradicted a key scientific dogma of bacteriology, the Koch–Pasteur concept of 'virus fixe', which asserted that an attenuated bacterial strain could not return to its initial pathogenicity. This point was one of Fleck's scientific research interests in the 1930s and a line of argument that appears in his *Genesis and Development*. From a scientific perspective, it was impossible in 1930 to confirm that spontaneous variability of bacteria was not the cause of the Lübeck accident. Some experts testified to this conclusion and the court acknowledged it openly. But this explanation directly contradicted a central scientific dogma of bacteriology. Most experts refused to entertain this scientifically disturbing conclusion. From an ethical perspective, the two physicians followed tacit principles of the professional system in which they had evolved. If there had been any abuse of power or illegal acts, they were not the responsibility of any individual but concerned standards of practice admissible to, and used by, most medical professionals. Responsibility should be assigned to 'today's system of scientific medical industry' declared Moses further on.[64] But, in the end, the court held individuals responsible for the events. Maybe from a legal perspective this was the easiest solution to the problem of justice being seen to be done, but symbolically it designated individuals as scapegoats.

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[58] Ibid., pp. 85–7.
[59] LASH, Abt. 352, Nr. 297, Urteil der II. Grossen Strafkammer, pp. 122–56.
[60] Moses, *Der Totentanz von Lübeck*, p. 4.
[61] LASH, Abt. 352, Nr. 297, Urteil der II. Grossen Strafkammer, pp. 92–121.
[62] Hahn, 'Der Lübecker Totentanz', p. 63; Bonah, 'Ethique et Recherche Biomédicale', pp. 33–6.
[63] LASH, Abt. 352, Nr. 297, Urteil der II. Grossen Strafkammer, pp. 122–52.

Furthermore, the general way in which a consensus was established during the trial can be compared with the functioning of Fleck's expert thought-collectives and what he has called the 'tenacity of systems of opinions and the harmony of illusions'.[65] At the very heart of Fleck's *Genesis and Development* is the idea of the strong social dependence of all knowledge. According to him, 'when a conception permeates a thought-collective strongly enough, so that it penetrates as far as everyday life . . . any contradiction appears unthinkable and unimaginable'.[66] Hans Much (1880–1933) professor of medicine at Hamburg and one of the dissident voices in the chorus of experts, declared with respect to the Lübeck catastrophe:

> Nowhere is there so much politics and intrigue as in the so-called medical sciences . . .. Medical Congresses are often unfree and unfruitful due to their dogmatic character and their predetermined general orientation.[67]

Much echoes the constraint of thought by a thought-style that Fleck described at length. The only difference is that what Much analysed as intrigues of individuals, Fleck described as the general functioning of collective perception. Once again, Fleck supported a better understanding of science by scientists themselves and by the general public rather than the moral judgement of individuals in a system. Beyond this, for Fleck there existed a second phase in the life cycle of ideas and theories:

> Every comprehensive theory passes first through a classical stage, when only those facts are recognized which conform to it exactly, and then through a stage with complications, when the exceptions begin to come forward. In the end there are often more exceptions than normal instances.[68]

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[64] Moses, *Der Totentanz von Lübeck*, p. 7.

[65] For the comparison with the legal use of the concept of fact, see S. Toulmin, 'Ludwik Fleck and the Historical Interpretation of Science', in Cohen and Schnelle (eds), *Cognition and Fact*, 267–85, p. 278.

[66] Fleck, *Genesis and Development*, pp. 28–9.

[67] Moses, *Der Totentanz von Lübeck*, p. 77.

[68] Fleck, *Genesis and Development*, pp. 28–9.

On several occasions in his monograph, Ludwik Fleck hinted that this was precisely what was happening to bacteriology in the 1930s: the crisis of scientific knowledge in bacteriology.[69]

> We see the same thing happening [a stage with complications] in the classical theory of infectious diseases. Every infectious disease was supposed to be caused by very small living 'agents'. Nobody could see that these agents were also present in healthy persons, because the phenomenon of the germ carrier was not discovered until much later. The variability of micro-organisms was a second shock. At the time when Koch's theory of specificity held complete sway, any variability was unthinkable. . . . A third shock is waiting for the classical theory of infection by the theory of the filterable virus. It will be shown that an invasion by a causative agent, which is the classical cause of infection, is actually an exceptional way to produce an infection.[70]

Shortcomings in identification and definition of bacterial species, families, and even individual types due to the extreme degree of variation in bacteria,[71] provided theoretical bacteriology with further inherent difficulties.[72] It was precisely these difficulties that were uncovered to a certain extent by the vaccination catastrophe in Lübeck.

In Lübeck, divergent opinions were marginalized and nationalistic interpretations against the French Calmette were quickly dismissed. At first glance, and in light of the prevailing Franco-German rivalry and hostility, this reaction seems astonishing. Reading Fleck on the functioning of thought-collectives helps to some extent to explain the surprising fact that any potential national competition did not escalate:

> The more specialized a thought-community is and the more restricted in its content, the stronger will be the particular thought-nexus among the members. It breaks down boundaries of nation and state, of class and age.[73]

That was precisely what happened in Lübeck. The specialized community favoured concerns about bacteriology over political and national rivalry despite the enormous tension of the moment. It triggered an international defence of bacteriology throughout Europe. The thought-collective defended premises and prestige in a sacred union against outside critics and their accusations. In contrast to Moses, Fleck does not pay much attention to the question of power, or its use and abuse by the esoteric, elite, expert-scientist circle; it was a part of Fleck's interpretation, but it was not central to his argument. If ultimately Moses was most interested in politics, Fleck, in contrast, was most interested in science.

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[69] Ibid., p. 18. 'A few important points remain to be made concerning the idea of the causative agent. . . . A good example is the "infection inapparente" (Nicolle) which progresses without clinical illness. . . . Another probably related is that of the completely harmless germ carrier who harbours certain bacteria far more often than the associated disease. Consequently the idea of the causative agent has lost the overriding importance it enjoyed during the classical period of bacteriology.'

[70] Ibid., pp. 29–30.

[71] Ibid., p. 61. 'Now continuous biological changes, within any complex biological individual, . . . can be divided into several categories. . . . Or they are cyclic changes of which some are genotypically conditioned and others are the result of reciprocal action within the complex life unit. These include the life cycle of organisms (ageing), generational change, and some of the dissociation phenomena of bacteria. Both serogenesis and immunogenesis must be listed here, as well as the virulence as a life phase of bacteria and even some infectious diseases.' On bacterial variation, see further pp. 87–93.

[72] Ibid., pp. 18–19. 'Theoretical bacteriology has further inherent difficulties. The biological character of Spirochaeta pallida is closely related or similar to that of S. cuniculi, S. pallidula, S. dentium, and others. It can be distinguished only by means of tests on animals. S. pallida should therefore be defined by syphilis, instead of the other way around. (Syphilis defined by S. pallidum). An additional factor is the extreme degree of variation in bacteria, which in some families is so great that, for the time being, classification of such species is out of the question. Unpredictable fluctuations in virulence, such as transformations of the saprophytes into parasites and vice versa, altogether destroy the relation which initially appeared so simple between a given type of bacterium and its associated disease.'

[73] Ibid., p. 107.

Thought-collectives, Scientific Facts, and Legal Responsibility

Seventy-seven children 'killed by science at a tender age'.[74] Who was responsible? The Lübeck judgement did not satisfy Moses. Again and again he challenged the medical profession as a whole:

> The medical corporation has to seriously ask itself whether in Lübeck only some individual physicians transgressed the ethical guidelines of their profession, or rather whether today's system of scientific medical industry is not really responsible and guilty. I say it is the system.[75]

The system that Moses criticized was the unlimited and uncontrolled system of scientific medical education and research transforming physicians into researchers, hospitals into research institutions, and patients into 'material' and 'experimental objects'.[76] For the socialist member of parliament, individual physicians were only the 'educational products' of this system. In Lübeck, the armada of experts quickly agreed upon the interpretation that the catastrophe was due to an accident caused by human failure and poor scientific practice. The two scenarios that were excluded correspond roughly with the large interpretative lines of Moses' conception of 'experimental rage' and Fleck's conception of instability and social construction of scientific dogma. The expert thought-collective of German bacteriologists established a consensus around their own views of the catastrophe. Two individuals were responsible for transgressing the limits established by the code of honour of the profession and the objectivity of scientific facts. The trial should be concerned neither with the medical profession's moral health, nor with the general value of science and its facts. Furthermore, if facts were not certain for science anymore, neither were they for law. Legal reasoning, though, needed the scientific fact as a basis for judgement. The legal and scientific circles sustained each other, just as Fleck described the mechanism of thought-collectives translating information from esoteric to exoteric circles : 'I wanted your support, but you went and used me to support yourself.'[77]

Mutual reinforcement was the conclusion of Fleck's astonishing analysis trying to explain the faith of the experts and the general public in the certainty of scientific facts. Scientific facts were the very basis for medical action, and during the Lübeck trial scientific facts became the foundation for legal proof and judgement. But Fleck questioned the validity of the category of fact as a foundation for medical action. Beyond this, the category would certainly need to be questioned as the foundation of judgements about the legal responsibility for such an action.

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[74] Moses, *Der Totentanz von Lübeck*, p. 7.

[75] Ibid., p. 7.

[76] Ibid., pp. 76–7.

[77] Fleck, *Genesis and Development*, p. 114.

> Why did bacteriologists for a time fail to see the phenomena of variability? At first there was a period of controversy, involving unconnected details, when variability was too much taken for granted. . . . This was followed by the classical Pasteur–Koch period. The all-persuasive power of practical success and personalities created a rigid thought-style in bacteriology. Only a strictly orthodox method was recognized and the findings were accordingly very restricted and uniform. . . . As a result, all secondary changes in the cultures, which were the starting point for the restyled theory of variability, escaped attention. . . . Now things are turning around.[78]

If bacteriological theories were changing, individuals could not be held responsible for the general misunderstanding of what scientific facts really were. Socially constructed by its very nature, expert thought-collectives and ultimately society as a whole was responsible for the validity of a fact. Although the profession and society by and large preferred to minimize the potential for conflict and stigmatize individuals in particular situations as scapegoats, neither Moses nor Fleck agreed. There was something to be understood and said about 'the system'.

Public Understanding of the Crisis and the Crisis of Public Understanding

The last major question arising from the Lübeck trial was that of the information given to the public. Lawyers and prosecutors accused the two physicians in charge of having deliberately withheld information from the public.[79] In particular, it was maintained that the scientific controversies around the BCG vaccine should have been mentioned by the physicians to the public health bodies and to the general public. The judgement generally recognized this point, but the legal argumentation had its own rationality. The legal starting point for the accusation and the judgement was the act that led to the fatal contamination; in other words, the administration of the BCG vaccine. According to this argument, any decisions prior to that act—for example the decision-making process about introducing the vaccination and giving information to the public—were not legally relevant despite their bearing on the justice or injustice of the actions. As unsatisfying as this argument was, the failure to provide relevant information was not to be taken into consideration. Information and decision-making procedures were considered elements of the public health system external to the concrete accusations of the trial. Nevertheless, for the public they remained a crucial element in the dysfunction of the system illustrated by the events at Lübeck. Reading Fleck, this point cannot be omitted; rather, it was central to his analysis.

Fleck, in his monograph, proposed a crucial and unconventional interpretation of the exchange of knowledge between the centre of its production and the periphery. In his fundamental passage on the construction of fact in a laboratory examination he declared:

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[78] Ibid., pp. 92–3.

[79] LASH, Abt. 352, Nr. 297, Urteil der II. Grossen Strafkammer, pp. 91–2.

> Every communication, every naming tends to make any item of knowledge more popular. . . . Certainty, simplicity, vividness only appears in popular knowledge. That is where the expert obtains his faith in this triad as the ideal of knowledge.[80]

In its transformation from the laboratory expert to the medical practitioner, an individual opinion becomes a stylized description. A step further in the communication with an even more peripheral group, the knowledge becomes even simpler and more apodictic. Based upon the expert reporting 'microscopic aspect: numerous bacilli, many of which are club-shaped and slightly curved . . . Culture: Costa medium, purplish red, slightly smeary . . . in view of the origin of the throat and the morphological and culture characteristics the diagnosis of Löffler bacilli seems sufficiently established', the general practitioner informs the mother of the child examined that 'her child has diphtheria'.[81] The expert version, although theoretically far more precise, does not appeal to the general public. No matter how a given case may be described, the description is always a simplification, as when the Lübeck physicians declared that vaccination by BCG was effective and harmless. However important this analysis may be for the functioning of everyday medical sciences, Fleck leaves the reader with this example of medical practice and comes to no conclusion. In a certain way, in my analogy, Fleck answers Moses' accusation of the immoral withholding of information with the idea that every communication, especially with non-experts, necessarily renders knowledge more apodictic, simple, and sure. Transmission is always translation and thus deceit. Simplification and thus omission of information are the very basis of popularizing expert knowledge and patient information. Objective information is just as impossible as objective truth. Information is always oriented towards an aim and thus is not necessarily withheld or falsified by the individual giving it. Rather, information is partial and biased by the very essence of its existence and its exchange.

> Popular exoteric knowledge stems from specialized esoteric knowledge. Owing to simplification, vividness, and absolute certainty it appears secure, more rounded and more firmly joined together.[82]

According to Fleck, 'every didactic introduction is therefore literally a "leading into" or a gentle constraint'.[83] Information is not being withheld, but rather it is intersubjectively and unconsciously shared and transformed. The best Fleck can propose in that circumstance is what is happening in the 1930s, the awakening of a control function exercised by the masses. Not only public accountability, but also information, consent, and public opposition to medical power were needed.

Julius Moses and his contemporary medical colleagues viewed patients' rising autonomy, their questioning, and occasional opposition as the clear signs of a crisis of public confidence in modern medicine. Political instability, economic depression, and social conflict in Weimar Germany certainly contributed to the medical profession's moroseness and furthered the sentiment that physicians were losing their social and professional standing. Ludwik Fleck took a different view. At the moment when democracy was being buried in Fascist Italy and Nazi Germany, Fleck argued that the so-called loss of confidence could be interpreted just as easily as a healthy opposition to the power of the medical elite. Autonomy and democracy served in this case as the only possible protection against a mechanism inherent in the genesis and development of scientific facts.

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[80] Fleck, *Genesis and Development*, pp. 114–15. (The translation here has been slightly revised.)

[81] Ibid., pp. 113–15.

[82] Ibid., p. 113.

[83] Ibid., p. 104.

> If the masses occupy a stronger position, a democratic tendency will be impressed upon the relation with the esoteric circles. The elite panders, as it were, to public opinion and strives to preserve the confidence of the masses. This is the situation in which the thought-collective of science usually finds itself today. If the elite enjoys the stronger position, it will endeavour to maintain distance and to isolate itself from the crowd. Then secretiveness and dogmatism dominate the life of the thought- collective.[84]

For Fleck, Moses' crisis of the medical profession was not so much a crisis, but rather the strengthening of the public opinion that offered the only possible answer to the impossibility of objectivity and the elite's power over the production of expert knowledge. In terms of the elite's relation to the masses, only a democratic foundation could lead to the development of ideas and progress, whereas domination of an elite potentially induced conservatism and rigidity.[85]

Conclusion

Debates on the crisis of the medical profession and human experimentation disappeared rather quickly in Germany after the National-Socialists had come to power in 1933.[86] This might shed some light on Fleck's motivations for publishing his 1935 monograph not in Nazi Germany but in Switzerland. This might be especially true since his plea for democracy and his critical analysis of science was certainly disturbing to a rather conservative profession.

I have argued that one of the central themes of Fleck's book that relates to the particular social and historical situation of German medicine in the 1930s is the question of crisis and change in scientific knowledge and the behaviour and responsibility of individuals in this situation. Fleck himself stated that his 'sole purpose has been to demonstrate how even specialized knowledge does not simply increase, but also fundamentally changes'.[87] It seems to me that questions raised by the Lübeck catastrophe were so self-evident in Germany during the early 1930s that they were not explicitly mentioned but formed an omnipresent background to Fleck's approach.

If knowledge changes and individuals at certain stages are unaware of their own habits and standards of thought, individual scientists cannot be simply divided into two camps, 'bad scientists' who miss the truth and withhold contradicting facts, and 'good scientists' who establish and publish only objective truths.[88] This scheme of interpretation has become a leading discourse of bioethics ever since the Nuremberg Medical Trial in 1946–7. Fleck's crusade for a better understanding of science by the public and by scientists themselves offers a different approach to a dilemma that is still present for today's physicians; a division between knowledge versus care, and information versus deceit. What Fleck underlines is that, although there is no ideal solution, there is at least a consciousness to be attained.

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[84] Ibid., pp. 105–6.

[85] Ibid., p. 106.

[86] A. Frewer, *Medizin und Moral in Weimarer Republik und Nationalsozialismus. Die Zeitschrift "Ethik" unter Emil Abderhalden* (Frankfurt a.M., 2000).

[87] Fleck, *Genesis and Development*, p. 64.

[88] Ibid., p. 116

Furthermore, if scientific knowledge is the result of intersubjective perception and intercollective communication, then the responsibility for its risks and benefits cannot be assigned exclusively to individuals. In contrast, the legal system in Lübeck had to establish individual responsibilities. Even if Moses demanded that the system, as the entity responsible, should be judged in Lübeck, the inherent legal logic took a different course. Re-reading Fleck in this perspective sharpens our understanding of where the court's response to questions of medical ethics suffers from a certain short-sightedness. In any case, the responsibility of the system as indicated by Moses and Fleck are not identical, even if they refer to similar observations. According to Fleck, it is not 'experimental rage' but our general understanding of the genesis and the development of a scientific fact that we have to reflect upon. This is one of the profoundest ideas Fleck has to offer to today's reader. The ethical questions of a given time can and should be answered by a better understanding of science and not just by moral and ethical reasoning. This is a challenge the social history of the medical sciences should take seriously.

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